IN THE CLAIMS

Claims 1-23 (canceled).

Claim 24 (currently amended) A microreactor for performing heterogeneous catalytic reactions, having a multiplicity of chambers in vertical or horizontal and essentially parallel arrangement, each being equipped with at least one feed line and one discharge line, the feed lines being connected to at least one manifold and the discharges to at least one header, the chambers being formed by stacked plates or layers, and one part of the chambers representing reaction chambers and the other part of the chambers representing heat carrier chambers, the heat transport between reaction and heat carrier chambers taking place through at least one common chamber wall formed by a common plate, with spacers being arranged in all chambers, wherein catalyst material is applied at least in part to the internal walls of the reactor chambers, whereby the hydraulic diameter, defined as the quotient of the four-fold area to the circumferential length of the cross section of free flow, in the reaction chambers is smaller than 4000 µm ~~(and advantageously smaller than 1500 µm and ideally smaller than 500 µm)~~, and the ratio between the smallest perpendicular distance between two neighboring spacers to the slot height of the reaction chamber after coating with catalyst is smaller than 800, and greater than or equal to 10.

Claim 25 (previously presented) The device in accordance with claim 24, wherein the share of the standing or base area of the spacers in relation to the area of the plate lying within a circumferential gasket and welded or soldered sealing seams terminating the reaction chamber or heat carrier chamber equals at least 2.5%, and does not exceed 30%.

Claim 26 (previously presented) The device in accordance with one of claim 24, wherein spacers constructed as webs or continuous webs have a web width greater than or equal to 1000 µm and are not wider than 6000 µm.

Claim 27 (previously presented) The device in accordance with claim 24, wherein the catalytic material is applied in a slot essentially on the plate.

Claim 28 (previously presented) The device in accordance with claim 24, wherein at least partial areas of the manifold and/or header are coated with catalytic material or are made of material with a catalytic effect.

Claim 29 (previously presented) The device in accordance with claim 24, wherein the material of at least a partial area of the chamber wall or the spacers has a catalytic effect.

Claim 30 (previously presented) The device in accordance with claim 24, wherein the feed lines and discharges of the reaction and heat carrier chambers are arranged to result in a co-directional, counter-directional or meandering throughflow in relation to the next chamber.

Claim 31 (previously presented) The device in accordance with claim 24, wherein the plates have recesses in the reaction chambers, in which at least part of the catalyst material is inserted, the recesses being able to assume any shape and being designed in groove form and extending exactly in one gap.

Claim 32 (currently amended) The device in accordance with claim 24, wherein the webs of two plates are arranged facing each other so that the webs form an angle of 0° to 90° with each other ~~and ideally are arranged parallel with and directly above each other~~.

Claim 33 (previously presented) The device in accordance with claim 24, wherein provision is made for at least one device at the entrance to and inside the reaction chambers in direction of the main stream, which reduces the free cross sectional area perpendicular to the direction of the main stream, the device having a random shape.

Claim 34 (previously presented) The device in accordance with claim 24, wherein provision is made for at least one area at the entrance to and inside the reaction chambers in which at least two fluids are mixed, whereby at least one fluid is injected essentially perpendicular to the direction of the main stream and a homogenization section is arranged downstream of the injection unit.

Claim 35 (previously presented) The device in accordance with claim 34, wherein a fluid is injected through bores in the chamber wall, which are inclined at an angle of -60° to +60° in relation to the perpendicular to the direction of the main stream and are connected by means of at least one fluid channel extending essentially transverse to the direction of the main stream.

Claim 36 (previously presented) The device in accordance with claim 24, wherein provision is made for at least one device at the end of the reaction chambers in flow direction, which reduces the free cross sectional area perpendicular to the direction of the main stream, the device having a random shape and being constructed advantageously of a multiplicity of spacers, as extensions of the web widths or as baffles and ideally as a reduction of the gap height.

Claim 37 (previously presented) The device in accordance with claim 36, wherein the pressure loss due to the cross section reduction at the outlet of the plates has to be greater than the fluctuation of the pressure difference resulting from the production tolerances of the catalyst layer and/or the gap by at least the factor 5.

Claim 38 (previously presented) A process for the use of the device in accordance with claim 24, wherein liquid or gaseous media are passed through in the heat carrier chambers.

Claim 39 (previously presented) The process in accordance with claim 38, wherein the media in the heat carrier chambers change their aggregate condition completely or partly while passing through.

Claim 40 (previously presented) The process in accordance with claim 24, wherein the process lies at differential pressures between the reaction and heat carrier chambers in the range of 0 bar to 15 bar.

Claim 41 (previously presented) The process in accordance with claim 38, wherein the process is used at temperatures below 500 °C.

Claim 42 (currently amended) The process in accordance with claim 38, wherein the process is used in the synthesis process selected from the group consisting of ~~for at least one of~~:

a) the synthesis of hydrocarbon compounds or the oxygenates thereof;
b) the synthesis of propylene oxide from essentially hydrogen peroxide and propene;
c) the synthesis of phenol; and
d) the synthesis of hydrogen peroxide from essentially hydrogen and oxygen.

Claim 43 (new) The device according to claim 24, wherein the hydraulic diameter in the reaction chambers is smaller than 1500 µm.

Claim 44 (new) The device according to claim 24, wherein the hydraulic diameter in the reaction chamber is smaller than 500 µm.